

REPLACE BY
ART. 34 ANDT

CLAIMS

1.- A method for capacitive detection of the presence of target sample on a substrate, comprising the steps of:

- binding a target sample to selective binding sites on the substrate, the target sample being directly or indirectly labelled with conductive labels,
- sensing the presence of the bound conductive labels to a binding site to thereby determine the presence of the target sample,
wherein the sensing step is carried out by a non-ohmic contacting, capacitive detection of the presence of the conductive labels.

10 2.- A method according to claim 1, furthermore comprising, before the binding step, a preliminary capacitance measuring step.

3.- A method according to claim 2, furthermore comprising a step of comparing the preliminary capacitance with the capacitance measured during the sensing step.

4.- A method according to any of the previous claims, wherein the labels are formed or
15 enlarged prior to or during the sensing step.

5.- A method according to claim 4, wherein the labels are formed or enlarged by precipitation of a metal.

6.- A method according to any of the previous claims, wherein capacitance is measured as function of frequency to obtain a value representative of a electrical resistive
20 property of the conductive label.

7.- A method according to any of the previous claims, wherein a global impedance is measured and the real part of the global impedance is used in addition to the capacitive part.

25 8.- A method according to any of the previous claims, furthermore comprising a step of optical detection of the presence of the label.

9.- A method according to any of the previous claims, furthermore comprising a step of magnetic or radioactive emissions detection of the presence of the label.

30 10.- Capacitive sensor device for determining the presence of a target sample, conductive labels being directly or indirectly couplable to the target sample, the capacitive sensor device comprising a substrate being able to selectively bind at a binding site or having attached thereto a binding site able to selectively bind a target sample, a capacitive sensor element, and sensing circuitry for determining the

~~REPLACED BY~~~~ART 34 AMDT~~

- presence of a target sample bound to the binding site by application of electrical signals to the capacitive sensor element,
wherein the capacitive sensor element comprises a set of at least two electrodes with non-conductive surfaces in a region associated with the binding site.
- 5 11.- Capacitive sensor device according to claim 10, wherein the intercapacitance value of the electrodes changes when detecting the presence of conductive labels at least when coupled to the target sample.
- 10 12.- Capacitive sensor device according to any of claims 10 or 11, wherein the set of electrodes are an array of parallel fingers which can be individually addressed in pairs.
- 13.- Capacitive sensor device according to any of claims 10 to 12, wherein the set of electrodes are interdigitated electrodes with parallel fingers, all fingers related to one electrode being short-circuited.
- 14.- Capacitive sensor device according to any of claims 10 or 11, wherein the set of electrodes are an array of crossed fingers whose intersections can be individually addressed in pairs.
- 15 15.- Capacitive sensor device according to any of claims 10 or 11, wherein the set of electrodes are a matrix of point electrodes.
- 20 16.- Capacitive sensor device according to any of claims 10 to 15, wherein a third electrode is provided insulated from the set of at least two electrodes, enabling the measurement of a second set of capacitive values.
- 17.- Capacitive sensor device according to any of claims 10 to 16, wherein the substrate comprises a semiconductive layer.
- 25 18.- Capacitive sensor device according to any of claims 10 to 17, wherein the presence of the conductive label creates a gate of a MOS or EEPROM like structure embedded in the semiconductor below the binding test sites.
- 19.- Capacitive sensor device according to any of claims 10 to 18, wherein the distance between the electrodes is reduced to a dimension comparable with the size of a single label.
- 30 20.- Capacitive sensor device according to claim 19, wherein the distance between two electrodes is 5 µm or less, preferably 2 µm or less.
- 21.- Capacitive sensor device according to any of claims 10 to 20, furthermore comprising a comparator unit, the outputs of the first and second capacitive sensing

elements or first and second groups of capacitive sensing elements being fed to a comparator unit.

22.- Capacitive sensor device according to any of claims 10 to 21, furthermore comprising an optical detector for determining the presence of the target sample.

5 23.- Capacitive sensor device according to any of claims 10 to 22, furthermore comprising a magnetic or radioactive emissions sensor for determining the presence of the target sample.

24.- Capacitive sensor according to any of claims 10 to 23, wherein the electrodes are made from a metal.

10 25.- Capacitive sensor according to claim 14, wherein the non-conductive surfaces are an oxide layer, a nitride layer, a paint or a lacquer.

26, - Capacitive sensor according to claim 24, wherein the metal is aluminium, and the non-conductive surfaces are formed by alumina.

27.- Capacitive sensor according to claim 24 or 25, wherein the metal is a non-noble
15 metal.